

that diamonds that have been cut by the lapidary's wheel lack some of the brilliancy found in gems that have been simply cleaved. It appears, too, that the diamonds of different districts differ to a very marked extent in their degree of hardness; the diamonds of New South Wales, indeed, are so much harder than those from other districts that they can only be cut and polished with their own powder.

Rubies, sapphires, emeralds, and other coloured stones are of less hardness than diamonds, and their cutting and polishing can be effected by means of diamond dust, carborundum, corundum, or emery. But in the case of these softer gems great delicacy of touch, rather heavy pressure and friction are required for their successful facetting. The gems to be polished are cemented on the end of a holder made of hard wood about the size of a short penholder, and are cut and polished by being held against metal discs ("laps") supplied with the abrasive and polishing powders (Fig. 3).

The latter portion of the book, which deals with the nature, localities, and treatment of the various kinds of gem-stones, presents few features of interest as compared with other works of the kind. On some points, as, for example, in the remarks on the artificial production of precious stones, the information given is neither very complete nor very exact; but even in this part of the work there are occasional observations which are of considerable interest to the mineralogist.

J. W. J.

#### NOTES.

At the moment of going to press we learn with the deepest regret of the sudden death of Sir Michael Foster.

THE fourteenth International Congress for Hygiene and Demography will be held at Berlin on September 23-29. All papers and particulars referring to the congress may be obtained from the general secretary, Berlin 9 W., Eichhornstr. 9.

HERR E. L. BEYER, the founder of the world-famed colour factory at Chemnitz fifty years ago, died at San Remo on January 2 at the age of eighty-two years. The direction of the factory has for some time now been in the hands of his son-in-law, Herr Th. Körner.

THE organisations committee of the sixth International Congress held at Rome finds itself with a balance of about 20,000 francs. This sum of money it is proposed to divide into honoraria of 1000 francs each, to be given to young Italian chemists to enable them to be present at the next international congress, to be held in London in 1909.

A REUTER message from Brussels reports that at a meeting held on January 29 at the residence of M. Beernaert, Minister of State, it was decided in principle to organise a new Belgian South Polar Expedition. A scientific committee will determine the programme. The meeting appeared to be in favour of the scheme of oceanographic research submitted to the Mons Congress by M. Arctowski.

At the recent annual meeting of the Royal Microscopical Society, the following officers were elected for the ensuing year:—President, Lord Avebury; vice-presidents, Mr. Conrad Beck, Mr. A. N. Disney, Dr. J. W. H. Eyre, Dr. Dukinfield H. Scott; treasurer, Mr. Wynne E. Baxter; secretaries, Rev. Dr. W. H. Dallinger and Dr. R. G. Hebb.

At the annual meeting of the Entomological Society on January 23 it was announced that the following officers

had been elected for the session 1907-8:—President, Mr. C. O. Waterhouse; treasurer, Mr. A. H. Jones; secretaries, Mr. H. Rowland-Brown and Commander J. J. Walker, R.N. The outgoing president, Mr. F. Merrifield, delivered an address in which he discussed some of the causes of the persistent abundance or scarcity, generally or locally, of species and varieties of insects, and the relative importance of the consumption of their food and the attacks of their enemies. Reference was made to striking characters that seem of no biological importance, to habits and activities not directly concerned with nutrition or reproduction, and the manner in which they are affected by external conditions, and to structure and fixed habits indicating their ancestral history and affecting their present capabilities.

PROF. M. I. KONOWALOFF, professor of chemistry in, and at one time director of, the Polytechnikum in Kiev, died in his forty-ninth year as the result of an accident on December 24, 1906. After passing through the physico-mathematical faculty of the Moscow University, he became first an assistant and then a docent of chemistry in the same university; in 1896 he was appointed professor of inorganic chemistry at the Petrowskoje-Pasumowskoje Agricultural Academy, near Moscow, leaving there in 1899 for the new polytechnic at Kiev, in the building and equipment of which he had taken an active interest. In 1902 he was elected director, but owing to a number of unpleasantnesses having arisen he resigned in 1904. His most important scientific investigations dealt with the composition of the Caucasian petroleum; the nitration of various organic compounds; preparations of aldehydes and ketones; syntheses of aluminium haloids and their isomers; refractivity of nitrogenous organic compounds; nitrogen compounds of the terpene group and the methane series, &c.; the similarity between the iron salts of organic acids and the nitro-compounds. In addition to having displayed great scientific activity, Prof. Konowaloff was always a strong advocate of public lectures, especially for the working classes.

AN Association for the Promotion of Flight is in course of formation. The association will aim at assisting inventors and investigators to carry out experiments in artificial flight. In order to secure that no funds shall be subscribed by speculators with any hope of return, it is proposed that, in the case of its ultimate success in its object, the valuable assets, such as a facility for constructing practicable flight machines, should be handed, free of cost, to the nation. A provisional committee has been appointed, which includes the Hon. C. A. Parsons, F.R.S., Sir William Crookes, F.R.S., Major B. F. S. Baden-Powell, and others. Major Baden-Powell, who is the president of the Aeronautical Society, in a letter to the *Times* explains how the new association differs from the Aeronautical Society and the Aéro Club. He points out that the newly-formed association has for its main object the acquisition of a fund to be devoted to the purpose already explained. The intention is to make a public appeal, and it has been considered that this could be done better by an independent body than by the existing society. It is, however, clearly understood that the association shall work in entire accord, not only with the Aeronautical Society, but also with the Aéro Club.

THE birds of Irene, near Pretoria, by Mr. L. E. Taylor, illustrated by a plate of the eggs and nest of the black duck, and notes on a collection from N.E. Rhodesia, by Messrs. W. E. Stoehr and W. L. Sclater, form the sub-

ject of the two chief original articles in the Journal of the South African Ornithologists' Union for December last.

IN the fourth volume (pp. 173-192) of *Marine Investigations, South Africa*, Dr. W. G. Ridewood describes a new species of the hemichordate genus *Cephalodiscus*, obtained from a considerable depth in the Cape seas. The new form brings up the number of known species to seven.

THE report of the Felsted School Scientific Society for 1906 is illustrated with reproductions of photographs taken by the members of that body. The most interesting of these represents a nest, with eggs, of a moorhen, built on some sticks in the river Pett, about 3 feet from the bank, with the base of the structure touching the water. The society appears to be in a thriving condition.

THE Hon. Walter Rothschild has just presented to the British Museum (Natural History) a fine mounted specimen of a male Alaskan elk, or moose (*Alces machlis gigas*), which has been temporarily placed in the central hall behind the African elephant. The Alaskan elk, we may remind our readers, is the largest representative of its species, although some of the estimates of its height are almost certainly exaggerated.

WE have received the report of the museum committee for the County Borough of Warrington for the past year. It appears that Warrington was the first town in the United Kingdom to establish (in 1848) a rate-supported public library, and a tablet with an inscription to that effect has recently been placed in the building. The excavation of the site of the Roman station at Wilderspool has, for the present, been brought to a conclusion, and the spoils are in process of being arranged for exhibition.

THE fourth part of vol. iii. of the Transactions of the Hull Scientific and Field Naturalists' Club contains a coloured plate of the four known British-laid eggs of Pallas's sand-grouse. These constitute two complete clutches, both taken on the high wolds near Beverley in 1888, one on June 15 and the other on July 5. The only other known instance of this species breeding in the British Isles rests on the evidence of a young bird found in Morayshire. The eggs are the property of Mr. T. Audas.

UNDER the title of "Nature Names in America," Mr. Spencer Trotter, in the January number of the *Popular Science Monthly*, gives some interesting information with regard to the origin of the vernacular designations of many of the animals and plants of the United States. Raccoon, opossum, skunk, chipmunk, and moose are, it appears, taken direct from the Algonquin language. Miss L. P. Bush contributes a translation of a valuable article by Mr. Anton Handlirsch, of the Vienna Museum, on fossil insects and the development of the class Insecta.

MANY naturalists will remember that after the fresh-water jelly-fish *Limnocoedium* was discovered in 1880 and its little polyp stage also described, a very similar polyp, the *Microhydra ryderi*, was found in a back-water of the Delaware River, near Philadelphia, in the United States. In 1897 the veteran naturalist Mr. Edward Potts, of Philadelphia, described in the *American Naturalist*, without illustrative figures, the production of a medusa or jelly-fish by this little *Microhydra*. The observation escaped the notice of most zoologists, and it is therefore a matter of congratulation that Prof. Ray Lankester has obtained from Mr. Potts a full description of the budding of *Micro-*

hydra and of the medusa produced by it, accompanied by numerous excellent drawings. These are published in the December (1906) number of the *Quarterly Journal of Microscopical Science*. Figures are given for comparison of the medusa and polyp (*Limnocoedium*) from Regent's Park (1880), and of the medusa of Lake Tanganyika (*Limnocoecia*) described in 1893. Mr. Potts sent a preserved specimen of the North American fresh-water medusa to Prof. Lankester, who submitted it for examination to Mr. E. T. Browne, well known as a specialist on the medusæ, and a report and figures by him are published together with Mr. Potts's memoir. The medusa of *Microhydra* differs greatly from that of *Limnocoedium*, although the polyp form has many curious points of resemblance in the two genera. Only very young liberated medusæ of *Microhydra* have, as yet, been observed. There is obviously an opportunity for further study of a very interesting kind in regard to this last discovery made by Mr. Edward Potts, so well known to zoologists by his researches on fresh-water sponges.

THE methods of preparing an accurate survey of the plants growing in a plot of pasture or meadow-land is the subject of a small brochure by the Rev. E. A. Woodruffe-Peacock, published as No. 9 of the Rural Science Series. The system here explained in detail is recommended to the consideration of students taking up flora analysis from a biometric standpoint.

SELECTING as his subject the financial success of forest management, Dr. W. Schlich, F.R.S., delivered a lecture before the students of the Royal Agricultural College, Cirencester, that is published in the December (1906) number of the *Agricultural Students' Gazette*. While the lecture contains no new facts, it provides an excellent summary of guiding principles, and as a practical illustration Dr. Schlich quotes from the working plan drawn up by him for the Alice Holt crown forests in Hampshire.

A QUESTION that must frequently occur to fruit-growers is concerned with the causes that control the time of flowering of trees. An attempt to calculate in a general way the number of heat units received in different years is discussed by Mr. E. P. Sandsten in Bulletin No. 137 issued from the agricultural experiment station of the University of Wisconsin. As would be expected, conditions during the previous summer and autumn are no less potent than temperatures in the spring, while less important factors are connected with the condition of the soil and the characteristics or state of health of each individual plant. The author mentions that the number of units required to bring a tree to flower varies from year to year, but does not state whether the proportion of heat units required by different varieties remains constant, although it would appear that data suitable for deciding this point were collected.

THE Engineering Standards Committee has issued tables of British standard Whitworth screw threads, of British standard fine screw threads, and of British standard pipe threads. The tables can be obtained, post free, for a penny, from the offices of the committee, 28 Victoria Street, Westminster.

IN the discussion on Mr. H. Campbell's paper on suction engines and gas plants, read before the Institution of Engineers and Shipbuilders in Scotland (Transactions, vol. I., part iii.), Mr. F. J. Rowan gave a bibliography of the subject, bearing witness to the enormous amount of investigation and research that has been carried out during the past two or three years.

INVESTIGATIONS have shown that the yellow crystalline substance deposited from solutions of ammonium molybdate has the composition  $\text{H}_2\text{MoO}_4 \cdot \text{H}_2\text{O}$ . It was noticed as early as 1876, identified in 1882, and a crystal measurement made in 1903. The properties of this interesting chemical curiosity form the subject of a paper by Mr. J. H. Graham in the *Journal of the Franklin Institute* (vol. clxiii., No. 1).

In the *Engineer* of January 25 plans are given of the handsome and commodious new headquarters of the great American engineering societies in New York provided by the liberality of Mr. Andrew Carnegie. The two top floors are devoted to the libraries of the several societies, and it is intended so to administer the library of each that by bringing them together there may be created an extremely complete and valuable library of engineering science and practice.

STRIKING evidence of Japan's native industrial capacities is afforded by an admirably illustrated description, by Mr. O. G. Bennett, of Sumitomo Bessi, the great copper mine of Japan, in the *Engineering Magazine* (vol. xxxii., No. 4). Copper mining has been carried out for centuries at this peak of sulphide copper ore near the centre of the island of Shikoku. At the present time, 9000 tons of ore are raised daily by plant, modern in all engineering details, the transformation from the primitive methods having been wrought without the direct assistance of a single foreign engineer.

THE presidential address delivered by Mr. F. W. Taylor, of Philadelphia, to the American Society of Mechanical Engineers is summarised in the *Engineer* and in *Engineering* of January 11. The author, one of the inventors of the modern high-speed steels, has written an address on the art of cutting metals that deserves to become one of the engineer's classics. It is probably, both on account of its length and on account of the matter it contains, one of the most remarkable that has ever been offered to a learned society. It contains the main results of twenty-six years' study of the question of obtaining the maximum output from machine tools. As the best high-speed tool steel the author recommends a steel of the following composition:—vanadium, 0.32 per cent. to 0.29 per cent.; chromium, 5.95 per cent. to 5.45 per cent.; manganese, 0.07 per cent. to 0.11 per cent.; tungsten, 17.81 per cent. to 18.19 per cent.; carbon, 0.682 per cent. to 0.674 per cent.; and silicon, 0.049 per cent. to 0.043 per cent. He has succeeded in establishing formulæ sufficiently trustworthy for the production of slide-rules by means of which it is possible to determine in a few minutes the best speed and feed to use in executing any given piece of work in any given lathe, and with any given set of tools.

In one of the very valuable Bulletins (No. 275, Washington, 1906) recently issued by the United States Geological Survey, Mr. T. Nelson Dale describes the slate deposits and slate industry of the United States. It covers

154 pages, with twenty-five plates and fifteen illustrations in the text, and deals with the origin, composition, and structure of slate in general, and the slate deposits of the United States in particular. A full bibliography of slate and a glossary of geological and slate-quarrying terms are appended. The classification of slates adopted by the author is as follows:—I., aqueous sedimentary: A, clay slates, B, mica slates; (1) fading: (a) carbonaceous or graphitic, (b) chloritic, (c) hæmatitic and chloritic; (2) unfading: (a) graphitic, (b) hæmatitic, (c) chloritic, (d) hæmatitic and chloritic. II., igneous: A, ash slates, B, dyke slates. The scientific basis for these subdivisions is explained, and the microscopic and chemical analyses of typical slates are given. The Old Bangor quarry, Northampton County, Pennsylvania, is the largest slate quarry in the United States. The deposit measures 1000 feet along the strike, 500 feet across it, and 300 feet in depth. The general structure is a close, overturned synclinal crossed by almost horizontal cleavage. The



Old Bangor Slate Quarry, Bangor, Pa., S.S.W. End, showing the eroded overturned close syncline crossed by almost horizontal cleavage.

thickest bed of good slate is 9 feet thick. The product from the large beds is used for roofing, but that from the ribboned beds goes into mill stock. The value of the United States slate production in 1904 was 1,103,439 $\frac{1}{2}$ .

A PAPER on internal-combustion engines for marine purposes, by Mr. J. T. Milton, was read at the Institution of Civil Engineers on January 22. The economy and the increasing use of internal-combustion engines on land has led to considerable interest being taken in their application to marine purposes, and already a large number of such engines have been fitted in small craft on the Continent, in most of which heavy mineral oil is the fuel used. On land, various fuels are used for these engines, namely, petrol, refined oil, heavy oil, coal-gas, producer-gas, coke-oven gas, and blast-furnace gas, but for marine purposes generally producer-gas and heavy oil are at present the only available fuels. The special conditions required for a successful marine engine are:—(a) the engine must be reversible; (b) it must be capable of being quickly



stopped and of being quickly started, either ahead or astern; (c) it must be capable of being promptly speeded to any desired point between full speed and dead slow, which latter speed ought not to be greater than one-quarter of the full speed; (d) it must be capable of working well, not only in smooth water, but in heavy weather in a seaway in which the varying immersion of the propeller causes rapidly changing conditions of resistance. In marine engines the revolutions are practically proportional to the speed of the ship, and as the vessel's resistance increases much more rapidly than the speed, it follows that for a reduction of speed of revolution the mean effective pressure must be reduced much more than in proportion to the revolutions. This is a much more difficult problem in marine engines, where no fly-wheel is practicable, than on land, where the use of a heavy fly-wheel permits the suppression of alternate fuel charges.

A LITTLE essay of twenty-four pages has been published by M. Prosper de Lafitte on "The Magic Square of  $n$  with  $n$  Numbers." By this is meant a square with  $n^2$  spaces, containing the numbers from 1, 2, 3, . . .  $n$  each repeated  $n$  times, in such a way that each row, each column, and each diagonal contains each number once. This is, of course, a slightly different problem from that of the ordinary magic square, which contains all the numbers from 1 up to  $n^2$ ; and the author's claim to have produced a paper calculated to instruct as well as to entertain the reader is well justified. Messrs. Gauthier-Villars, of Paris, are the publishers.

In the *Atti dei Lincei*, xv., 10, Dr. Pietro Macchia discusses the relations between thermal conductivities at ordinary and at low temperatures. In determining the conductivity, observation is made of the distribution of temperature in a rod subject to surface radiation, when the flow of heat has become steady. Even at moderate temperatures results based on Stefan's law are shown to be better than those derived from Newton's law of cooling. Thus for pure lead, the ratio of the conductivities deduced from Stefan's law, for temperatures 18° and 100° respectively, works out at 1.016; Jäger and Diesselhorst's determinations, based on the consideration of non-stationary states, give 1.015, while the assumption of Newton's law gives 2.01.

MESSRS. A. E. STALEY AND CO., of 19 Thavies Inn, Holborn Circus, E.C., have submitted for our inspection a pair of their new "Nikos," 8x, prismatic binoculars, which are sold at the low price of 6l. 10s. The instrument is beautifully finished in Russia leather, and is of a very compact, light, and handy form, whilst its performance optically satisfied the critical tests to which we subjected the pair examined. There is a common focussing screw for both eye-pieces, one of which is fitted, however, with a separate arrangement, and the bending bar is adjustable to the distance between the observer's eyes by simply bending it the required amount. Both the special focussing arrangement and the bending bar are provided with scales, so that the habitual user may adjust the glasses before using them without having to make a series of trials each time. A pair of studs projecting from the object-glass end of the glasses enables the latter to stand flat on any horizontal surface.

THE issue of "Hazell's Annual" for 1907 is now available. The alphabetical arrangement of this cyclopaedic record reduces the trouble of reference to a minimum, and the comprehensive character of the contents makes the volume of wide interest.

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A THIRD edition of "The Mechanism of Weaving," by Mr. Thomas W. Fox, of the Manchester Municipal School of Technology, has been published by Messrs. Macmillan and Co., Ltd. The opportunity has been taken to revise the text carefully, to add matter relating to recent developments in weaving, to introduce numerous new illustrations, and generally to enhance the value of the work from the points of view of teachers, students, and men actively engaged in the cotton industry.

THE thirteenth edition of "Practical Sanitation," by Dr. George Reid, has been published by Messrs. C. Griffin and Co., Ltd. The appendix on sanitary law, by Mr. H. Manley, has been entirely re-written, and other parts of the work have undergone detailed revision, particularly the chapter which deals with sewage disposal. The work provides medical officers of health, sanitary inspectors and others interested in sanitation with a comprehensive survey of the practical and scientific aspects of sanitary science.

WE have received a copy of the first number of the *African Monthly*, a magazine to be devoted to literature, history, exploration, science, and art, as well as fiction. The new periodical is published by the African Book Company, Ltd., of Grahamstown, Cape Colony, and its price is 1s. The contents of the first issue are varied and interesting; scientific subjects are represented by two articles, "The Bantu in the Tenth Century. As described in Extracts from the 'Golden Meadows' of Al Mas'udy," by Mr. W. Hammond Tooke, and "Merino Sheep Breeding in Australia," by Mr. R. H. Harrowell. The magazine may be obtained in this country from Messrs. Wm. Dawson and Sons, Ltd., Cannon House, Breams Buildings, London, E.C.

#### OUR ASTRONOMICAL COLUMN.

THE RECENT TOTAL ECLIPSE OF THE SUN.—A telegram received by Prof. Kreutz from Prof. R. Schorr at Dschisak, in the province of Samarkand, states that during the whole time that the sun was eclipsed on January 14 the sky was totally obscured, and snow fell heavily. Only meteorological and some photometric observations were possible (*Astronomische Nachrichten*, No. 4150).

Herr Archenhold has received a similar message from another observer at Samarkand, whilst the Moscow observers are reported to have obtained no results even in the meteorological and photometric programme (*Das Weltall*, January 15).

THE SOLAR RADIATION.—The depression of the "solar radiation" during 1903, as observed at Warsaw, is dealt with in a paper communicated to the *Bulletin météorologique du Département de l'Hérault* by M. Ladislav Gorczyński. The observations showed that between December, 1902, and February, 1904, the radiation was abnormally low as compared with the mean for the years 1901–5. This phenomenon has previously been commented upon by various observers, and is supposed to have been due to the large amount of volcanic dust in our atmosphere. Two other abstracts from the same bulletin deal respectively with the variations of the intensity of the solar radiation with the height of the sun, and the amount of the insolation at Warsaw, Treurenberg, and Montpellier.

PHOTOGRAPHS OF GIACOBINI'S COMET (1905c).—The way in which a comet's tail develops as the comet approaches perihelion is beautifully shown by a series of photographs of Giacobini's 1905 comet which are published in Bulletin No. 25 of the Lowell Observatory. The series extends from December 14, 1905—eight days after the comet's discovery—when the object showed only a well-defined nucleus, to January 7, 1906, when three distinct tails are shown, the middle one extending to a distance of 10° from the head.